Space Robotics Challenge

Completed Technology Project (2014 - 2017)

Project Introduction

The Space Robotics Challenge seeks to infuse robot autonomy from the best and brightest research groups in the robotics community into NASA robots for future missions to Mars and/or the moon. In doing so, NASA will provide the country's most complex humanoid robots to these groups for testing.

Anticipated Benefits

Benefits to NASA Funded Missions: This technology provides potential benefits to any place humans explore. The humanoid robots can handle the dull, dangerous and dirty exploration, while humans use their problem solving abilities in situations where the robots require help. The application of these robots is to increase autonomy capabilities for both surface (R5/Valkyrie) and in microgravity (Robonaut). If successful, the results of this work could infuse directly onto Robonaut on ISS. Benefits to NASA Unfunded & Planned Missions: A primarily application of this work is to add autonomy for humanoid robotics. Current Human Mars architectures are showing that infrastructure for these human missions will be in place prior to launching humans. Within these architectures, robotic systems will set up infrastructure and serve as caretakers while waking for crew. The space robotics challenge tasks for R5/Valkyrie are directly applicable to this work. In transit to Mars, the pre-deployed assets spacecraft will need caretaking and maintenance. The autonomy coming out of the SRC is directly applicable to this task as applied to Robonaut class robots. Benefits to Other Government Agencies: Autonomy for humanoid robots has applications within the DoD for disaster relief. In fact, the SRC is a follow-on program to the DARPA Robotics Challenge. The Department of Energy has applications for robots and humanoid robots in waste cleanup. Benefits to the Commercial Space Industry: This item does not benefit the nation. Benefits to the Nation: The SRC places robots in university labs (MIT and Northeastern) as partners to validate space related tasks and to host competition teams during development. By offering NASA robots to the broader robotics community, it supports training of new top of profession performers, leading to new education of the formation of new robotics companies, benefitting the nation through a better educated workforce or a growing economy

The Human Robotics Systems: Space Robotics Challenge element will develop a Centennial Challenge for performing robotic tasks that will be needed to support future human exploration

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Primary U.S. Work Locations and Key Partners

Organizations Performing Work	Role	Type	Location
Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Exploration Capabilities	Supporting Organization	NASA Program	
Florida Institute for Human and Machine Cognition	Supporting Organization	Academia	Florida
National Science Foundation	Supporting Organization	US Government	
Technology Demonstration Missions(TDM)	Supporting Organization	NASA Program	

Primary U.S. Work Locations	
Florida	Texas

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Game Changing Development

Project Management

Program Director:

Mary J Werkheiser

Program Manager:

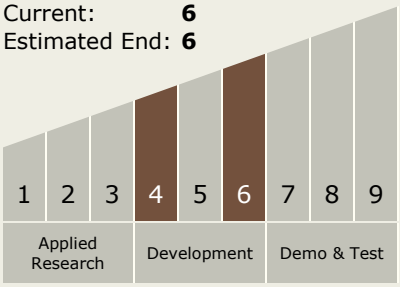
Gary F Meyering

Principal Investigator:

William J Bluethmann

Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



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Project Transitions

October 2014: Project Start

October 2017: Closed out

Closeout Summary: The Space Robotics Challenge has advanced autonomy for robotic systems toward enabling a human missions to Mars by presenting a robo tic competition challenge to the world, and by fielding R5 robots within the existi ng robotics research community. Over 400 teams registered and 90 teams comp eted in the virtual competition. The final competition was held at JSC and award ed prizes to the winning teams in June 2017. A Phase 2 competition has transiti oned to the centennial challenges program.

Images

HRS: Space Robotics Challenge
The Human Robotics Systems: Space Robotics Challenge element will develop a Centennial Challenge for performing robotic tasks that will be needed to support future human exploration *(https://techport.nasa.gov/image/143241)*

Project Website:

https://www.nasa.gov/directorates/spacetech/home/index.html

Target Destination

Earth